J. Entomol. Res. Soc., 22(2): 153-162, 2020 *Research Article*
Print ISSN:1302-0250 *Online ISSN:2651-3579*

New Records for the Caddisfly Fauna (Insecta: Trichoptera) of the Karadak Mountains, Western Balkans

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ABSTRACT

We collected adult caddisfly specimens occasionally during 2017 at the Karadak Mountains, which remains one of the least explored mountainous areas in the Western Balkans. Here we report 15 species, three of which are first records for the Karadak Mountains and Republic of North Macedonia: *Rhyacophila bosnica* Schmid, 1960, *Tinodes kimminsi* Sykora, 1962 and *Stenophylax permistus* McLachlan, 1895.

In addition to this, new localities of *R. bosnica* from Kosovo are reported. We discuss the distribution and ecology of this rare endemic species, including the first noted winter activity of the adult stage.

Key words: Trichoptera, Kosovo, R. North Macedonia, *Rhyacophila bosnica*, *Tinodes kimminsi, Stenophylax permistus*, new records.

Musliu, M., Ibrahimi, H., Bilalli, B., Stamenković, V.S., Hinić, J., & Bozdoğan, H. (2020). New records for the caddisfly fauna (Insecta: Trichoptera) of the Karadak Mountains, Western Balkans. J*ournal of the Entomological Research Society,* 22(2), 153-162.

INTRODUCTION

The Balkan Peninsula is one of the most important hotspots of caddisfly diversity in Europe. However, data about this group of aquatic insects in this region are still incomplete. Faunistic data for the caddisfly fauna of this area date back over a century ago (e.g. Radovanović, 1931, 1935, 1953; Klapálek, 1899,1902). Extensive investigations of caddisfly fauna of the Balkan Peninsula have taken place recently regarding geographic distribution patterns (e.g. Kučinić, 2002; Živić, Marković, & Brajković, 2006; Ćuk & Vučković, 2009; Stanič-Koštroman, 2009; Previšić & Popijač, 2010; Oláh, 2010; Ibrahimi, Kučinić, Gashi, & Grapci-Kotori, 2012a; Ibrahimi et al, 2012b, 2014a; Ibrahimi, Kučinić, Gashi, & Grapci-Kotori, 2014b; Ibrahimi et al, 2015a, 2015b), description of new taxa (e.g. Kučinić & Malicky, 2002; Malicky, Previšić, & Kučinić, 2007; Oláh, 2010, Ibrahimi et al. 2015a; 2016), description of larval stage of known species (e.g. Kučinić et al, 2008; 2013; Graf et al, 2008; Waringer et al, 2009), and ecological preferences, as well as phylogenetic and phylogeographic studies for several species (e.g. Pauls, Lumbsch, & Haase, 2006; Pauls, Graf, Haase, Lumbsch, & Waringer, 2008; Previšić et al, 2014).

Caddisfly fauna of the Republic of Kosovo has been intensively investigated during the past years (Gashi et al, 2015; Ibrahimi et al, 2012a, 2012b, 2013, 2014a, 2014b, 2015a, 2015b, 2016), while in Republic of North Macedonia this order of aquatic insects was only partially investigated (Oláh, 2010, 2011; Oláh & Kovács, 2013; 2014; Rimcheska et al, 2015; Slavevska-Stamenković et al, 2016; Bilalli, Ibrahimi, & Musliu, 2018).

The goal of this paper was to contribute to the knowledge of caddisflies of the Karadak Mountains (Kosovo, Republic of North Macedonia) including ecological knowledge of some rare species found during this investigation.

MATERIAL AND METHODS

Data sampling and processing

Adult caddisfly specimens were collected with entomological nets (EN) and ultraviolet light traps (UV) during 2016 and 2017. Collected specimens were preserved in 80 % ethanol. Ultraviolet light traps were left to operate from dusk to the next morning nearby the streambanks. The specimens were identified under a stereomicroscope with determination keys of Kumanski (1985; 1988) and Malicky (2004).

The collection is deposited at the Laboratory of Zoology of the Faculty of Natural and Mathematical Sciences, University of Prishtina, Republic of Kosovo. Systematic follows Morse (2017).

Study area

The sampling was carried out at six localities: three in Kosovo (S4 Lugu i Kopilaqës, S5 Lumbardhi i Pejës River and S6 Stream in Sharr Mountains) and three in the Republic of North Macedonia (S1 Tanushë, S2 bove Brodec and S3 Brodec) (Table 1). Karadak/Skopska Crna Gora is a mountain range located mainly in the Republic

of North Macedonia and Kosovo, while a smaller part of it is in Serbia. It lies between the cities of Kaçanik (in southern Kosovo) and Skopje (Republic of North Macedonia) until Anamorava (Kosovo) in the north-east and Preshevë (Serbia) in the south-east. The highest peak is Ramno (1,651 m asl) in the Republic of North Macedonia. Four localities are located in Karadak/Skopska Crna Gora Mountains, while the last two ones are outside this area and are taken into consideration because of the distribution of *Rhyacophila bosnica*.

Table 1. Locality data for the 6 sampling stations of caddisflies

Code	Sampling Stations	Latitude °N	Longitude °E	Altitude m
S1	Tanushë, North Macedonia	42.23356	21.42733	1358
S2	Above Brodec, North Macedonia	42.160165	21.448974	1350
S3	Brodec, North Macedonia	42.14192	21.4403	912
S4	Lugu i Kopilaqës, Kosovo	42.24605	21.43110	1160
S5	Lumbardhi i Pejës River, Kosovo	42.661901	20.249348	580
S6	Stream in Sharr Mountains, Kosovo	42.17506°	20.97593°	1410

RESULTS

During this investigation, we found 15 species belonging to seven families and 10 genera. The distribution of species within families is as following: Rhyacophilidae (5), Limnephilidae (4), Philopotamidae (2), Polycentropodidae (1), Psychomyiidae (1), Leptoceridae (1) and Beraeidae (1).

The highest number of specimens belongs to the following species: *Rhyacophila bosnica* (85 specimens), *Stenophylax permistus* (25 specimens) and *S. meridiorientalis* Malicky, 1982 (23 specimens), while all other species were found with less than twenty specimens. The following four species were found with one specimen only during the whole investigation period: *Rhyacophila obtusa* Klapalek, 1894, *Plectrocnemia conspersa* (Curtis, 1834), *Potamophylax pallidus* (Klapalek, 1899) and *Adicella filicornis* (Pictet, 1834). Eleven species were found each in one locality only (*Rhyacophila fasciata* Hagen, 1859, *R. polonica* McLachlan, 1879, *R. obtusa* Klapalek, 1894, *Wormaldia occipitalis* (Pictet, 1834), *Plectrocnemia conspersa* (Curtis, 1834), *Tinodes kimminsi*, *Potamophylax pallidus*, *Micropterna sequax* McLachlan, 1875, *Adicella filicornis* and *Beraea pullata* (Curtis, 1834).

Seasonal dynamics of *Rhyacophila bosnica* based on the number of adult specimens caught during this investigation and based on literature records (Gashi et al, 2015; Ibrahimi et al, 2014b) (Fig. 1) reveals its activity from early February to late July. Based on this, the highest activity of adults of this species was observed during March and May, while the lowest activity during February and June.

Systematic list of caddisflies collected at six stations in the Karadak Mountains (Kosovo and Republic of North Macedonia) and Lumbardhi i Pejës and Lepenc rivers (Kosovo) during the period February-August 2017. Details about sampling stations are given in Table 1. EN -Entomological net, UV-Ultraviolet light trap.

Family: Rhyacophilidae

Rhyacophila bosnica Schmid, 1970*

S1 Tanushë, Republic of North Macedonia: (EN) 04.02.2017. 1 ♂; (EN) 25.03.2017. 52 ♂♂, 1♀. S2 Above Brodec, Republic of North Macedonia: (EN) 04.02.2017. 2 ♂♂; 25.03.2017. 2 ♂♂, 20 ♀♀; S5 Lumbardhi i Pejës River 11.05.2019 (EN) 5 ♂♂, 2 ♀♀; S6 Stream in Sharr Mountains, Kosovo: 11.03.2019 (EN) 3 ♂♂, 5 ♀♀; 13.04.2019 (EN) 2 ♂♂, 3 ♀♀.

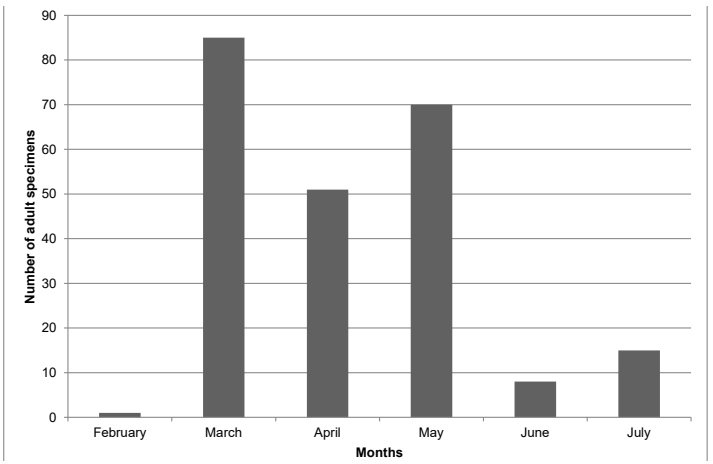

Fig. 1. Seasonal dynamics of the adult stage of *Rhyacophila bosnica.*

Rhyacophila fasciata Hagen, 1859

S4 Lugu i Kopilaqës, Kosovo: (EN) 30.08.2017. 6 ♂♂, 2 ♀♀.

Rhyacophila polonica McLachlan, 1879

S4 Lugu i Kopilaqës, Kosovo: (EN) 20.06.2017. 5 ♂♂.

Rhyacophila obtusa Klapalek, 1894

S3 Brodec, Republic of North Macedonia: (EN) 04.06.2017. 1 ♂.

Rhyacophila tristis Pictet, 1834

S2 Above Brodec, Republic of North Macedonia: (EN) 03.06.2017. 6 ♂♂, 1 ♀; S4 Lugu i Kopilaqës, Kosovo: (EN) 20.06.2017. 1 ♂, 2 ♀♀.

Family: Philoptamidae

Philopotamus montanus (Donovan, 1813)

S3 Brodec, Republic of North Macedonia: (EN) 04.06.2017. 3 ♂♂, (UV) 23.06.2017. 4 ♂♂, 2 ♀♀; S2 Above Brodec, Republic of North Macedonia: (EN) 03.06.2017. 1 ♂; (UV) 23.06.2017. 1 ♂; S4 Lugu i Kopilaqës, Kosovo: (EN) 20.06.2017. 1 ♂, 2 ♀♀.

***Wormaldia occipitalis* (Pictet, 1834)**

S2 Above Brodec, Republic of North Macedonia: (EN) 03.06.2017. 4 ♂♂; (UV) 23.06.2017. 3 ♂♂.

Family: Polycentropodidae

***Plectrocnemia conspersa* (Curtis, 1834)**

S3 Brodec, Republic of North Macedonia: (UV) 23.06.2017. 1 ♂.

Family: Psychomyiidae

Tinodes kimminsi* Sykora, 1962

S2 Above Brodec, Republic of North Macedonia: (EN) 03.06.2017. 3 ♂♂, 1 ♀.

Family: Limnephilidae

***Potamophylax pallidus* (Klapalek, 1899)**

S2 Above Brodec, Republic of North Macedonia: (UV) 06.08.2017. 1 ♂.

***Micropterna sequax* McLachlan, 1875**

S3 Brodec, Republic of North Macedonia (UV) 23.06.2017. 2 ♂♂, 1 ♀.

***Stenophylax meridiorientalis* Malicky, 1982**

S2 Above Brodec, Republic of North Macedonia: (UV) 04.06.2017. 9 ♂♂, 9 ♀♀; S3 Brodec, Republic of North Macedonia: (UV) 23.06.2017. 2 ♂♂, 3 ♀♀.

Stenophylax permistus* McLachlan, 1895

S2 Above Brodec, Republic of North Macedonia: (UV) 04.06.2017. 7 ♂♂, 5 ♀♀. S1 Tanushë, Republic of North Macedonia: (UV) 04.06.2017. 7 ♂♂, 6 ♀♀.

Family: Leptoceridae

***Adicella filicornis* (Pictet, 1834)**

S2 Above Brodec, Republic of North Macedonia: (UV) 23.06.2017. 1 ♂.

Family: Beraeidae

***Beraea pullata* (Curtis, 1834)**

S3 Brodec, Republic of North Macedonia: (EN) 04.06.2017. 2 ♂♂.

DISCUSSION

In this investigation, we found three species which are rare in the Balkan Peninsula based on the number of known localities, according to the current knowledge (e.g. Malicky, 2015, 2019; Neu, Malicky, Graf, & Schmidt-Kloiber, 2018): *Rhyacophila bosnica, Tinodes kimminsi* and *Stenophylax permistus*.

Species of the genus *Rhyacophila* Pictet, 1834 are widespread in the holarctic region (Schmid, 1970) and are found frequently at the different river and stream segments in the Balkan Peninsula. *Rhyacophila bosnica* is an endemic species of Ecoregion 5 and 6 (Ibrahimi et al, 2012b; Graf, Kučinič, Previšič, Vučkovič, & Waringer, 2008). Previously this species was reported from epirhithral, metarhithral and hyporhithral zones (Graf et al, 2008) but during this investigation was also found in eucrenal and hypocrenal segments at S1 - Tanushë and S3 - Brodec. The microhabitat/substrate preferences for larvae of this species include macro-/megalithal and hygropetric habitats (Graf et al, 2008). It was recently reported for the first time from Kosovo (Ibrahimi et al, 2012b, 2014b). According to Fauna Europea (Malicky, 2019), it is also present in the Republic of North Macedonia, even though detailed revision of the literature data did not confirm this conclusion. Hence, in this study, *R.bosnica* is reported from the Republic of North Macedonia for the first time. During this study, we found new localities of this Balkan endemic species from Kosovo. It was only known from few localities in Albania, Kosovo, Bosnia and Herzegovina and Serbia previously (Marinković-Gospodnetić, 1980; Ibrahimi et al, 2012b, 2014a; Oláh, 2010) and thus, our study greatly expands its known distribution area. During this investigation, we noted for the first time a winter activity of the adult stage of *Rhyacophila bosnica*. Adults of this species were observed walking on the snow throughout early March at station S6 in Sharr Mountains, and most surprisingly during the beginning of February at station S2 Above Brodec. Several ripe pupae and one adult were noted at the beginning of February at station S1 Tanushë as well. Based on literature records, this species was known to emerge from March to July (Marinković-Gospodnetić, 1980; Oláh, 2010; Ibrahimi et al, 2012b, 2014b; Gashi, Ibrahimi, Grapci-Kotori, Sejdiu, & Bislimi, 2015). The peak of adult activity is during March and May, although significant adult activity was noted during the late spring and beginning of summer as well (Fig. 1). This makes *R. bosnica* one of the earliest emerging caddisfly species at the Balkans, based on several years' long observations and literature records as well (e.g. Radovanović, 1931; Marinković-Gospodnetić, 1980; Kumanski 1985; Kučinić, 2002; Wiberg-Larsen, 2008; Stanić-Koštroman, 2009; Vučkovič et al, 2011; Ibrahimi et al, 2012a, 2014b). This is apparently one of the rarest, if not the only, species of the genus *Rhyacophila* to be active during the cold months of the year, at least in Balkans. We are not aware of any other such literature record. Most of the winter active species of caddisflies in the area belong to the family Limnephilidae. In this study, we registered the lowest altitude for this species in its entire range (580 m in station S5). Previously the species was found exclusively at altitudes higher than 1000 m asl. This species seems to prefer cold and fast-flowing streams. Although located lower, station S5 resembles the other sampling stations of higher altitudes, since the river flow is very fast and

the water temperature is low. A side-spring located nearby station S5 contributes to the lower water temperature of this river segment as compared to the other parts of Lumbardhi i Pejës River in this area of low altitude. A similar case was noted earlier with *Drusus krusniki* Malicky, 1981, which is a typical high altitude species, but was found at the altitude of 580 m asl at station S5 (Ibrahimi et al, 2014b).

Stenophylax permistus is a widespread species in Europe, present in almost all ecoregions and usually found in hypocrenal, epirhithral and metarhithral zones (Graf et al, 2008). It was found in two localities in the Republic of North Macedonia during spring. Adults of this species can be found throughout the most of the year. It is quite frequent in some parts of Europe, while the number of localities is still low in the Western Balkans and especially in the area surrounding Kosovo and North Macedonia, according to the current knowledge (e.g. Neu et al, 2018). It is known from a single locality in Kosovo and was reported only a few years ago (Ibrahimi et al, 2016b).

The species of the family Psychomyiidae, *Tinodes kimminsi* was found with only a few specimens in one locality only in the Republic of North Macedonia (S2 Above Brodec) and is reported for the first time for this country. This species is present in the following countries: Albania, Austria, Bulgaria, Czech Republic, Germany, Greece, Poland, Slovakia, and Turkey (Malicky, 2019). Most of the occurrence records in Balkans, according to the current knowledge, are from Bulgaria (Neu et al, 2018).

This investigation contributes to the knowledge about the caddisfly fauna composition of the Karadak Mountains in Kosovo and the Republic of North Macedonia. With several first findings for the area, it proves that this mountainous massive is still under-investigated. The presented data could be useful for selecting the high conservation areas of the Karadak/Skopska Crna Gora Mountains where effective protection measures should be applied.

REFERENCES

Bilalli, A., Ibrahimi, H., & Musliu, M. (2018). First records of the caddisfly fauna (Insecta: Trichoptera) from the Karadak Mountains, Western Balkans. *Natura Croatica*, 27(1), 143-151.

Čuk, R. & Vučkovič, I. (2009). First record of caddisfly *Rhyacophila laevis* Pictet, 1834 (Insecta: Trichoptera) in Croatia. *Natura Croatica,* 18, 449-453.

Malicky H (2019, April 22). Fauna Europaea: Trichoptera. Fauna Europaea version 2.6.2. http:// www.faunaeur.org.

Gashi, A., Ibrahimi, H., Grapci-Kotori, L., Sejdiu, N., & Bislimi, K. (2015). New Records of *Drusus siveci* Malicky, 1981 (Trichoptera, Limnephilidae, Drusinae) from the Balkan Peninsula, with Ecological Notes. *Acta Zoologica Bulgarica,* 67(2), 259-264.

Graf, W., Kučinič, M., Previšič, A., Vučkovič, I., & Waringer, J. (2008). The larva, ecology and distribution of *Tinodes braueri* McLachlan, 1878 (Trichoptera: Psychomyiidae). *Aquatic Insects,* 30, 295-299.

Ibrahimi, H., Kučinić, M., Gashi, A., & Grapci-Kotori, L. (2012a). The caddisfly fauna (Insecta, Trichoptera) of the rivers of the Black Sea basin in Kosovo with distributional data for some rare species. *ZooKeys,* 182, 71-85. doi: 10.3897/zookeys.182.2485

Ibrahimi, H., Kučinić, M., Gashi, A., Grapci-Kotori, L., Vučković, I., & Cerjanec, D. (2012b). The genus *Rhyacophila* Pictet, 1873 (Insecta: Trichoptera) in Kosovo. *Aquatic Insects*: *International Journal of Freshwater Entomology,* 34(1), 23-31. doi: 10.1080/01650424.2012.643021

Ibrahimi, H., Gashi, A., Grapci-Kotori, L., & Kučinić, M. (2013). First records of the genus *Micropterna* Stein, 1873 (Insecta: Trichoptera) in Kosovo with distributional and ecological notes. *Natura Croatica,* 22(1), 147-155.

Ibrahimi, H., Gashi, A., Bilalli, A., Musliu, M., Grapci Kotori, L., & Etemi-Zhushi, F. (2014a). Three new country records from the genus *Limnephilus* Leach, 1815 (Trichoptera: Limnephilidae) from the Republic of Kosovo. *Biodiversity Data Journal* 2, e4140. doi: 10.3897/BDJ.2.e4140

Ibrahimi, H., Kučinić, M., Gashi, A., & Grapci-Kotori, L. (2014b). Trichoptera Biodiversity of the Aegean and Adriatic Sea basins in Kosovo. *Journal of Insect Science,* 14(209), 1-8. doi: 10.1093/jisesa/ieu071

Ibrahimi, H., Kučinić, M., Vitecek, S., Waringer, J., Graf, W., Previšić, A., Bálint, M., & Keresztes, L., Pauls, S.U. (2015a). New records for the Kosovo caddisfly fauna with the description of a new species, *Drusus dardanicus* sp. nov. (Trichoptera: Limnephilidae). *Zootaxa,* 4032, 551-568. DOI:10.11646/zootaxa.4032.5.5

Ibrahimi, H., Gashi, A., Grapci-Kotori, L., Zhushi-Etemi, F., Bilalli, A., & Musliu, M. (2015b). New Distribution and Species Records of Caddisflies (Insecta: Trichoptera) from the Republic of Kosovo. *Entomological News,* 125(4), 229-238.

Ibrahimi, H., Previšić, A., Vitecek, S., Graf, W., Kučinić, M., Bálint, M., Keresztes, L., & Pauls, S.U. (2016a). *Drusus sharrensis* sp.n. (Trichoptera, Limnerphilidae) a new species from Sharr National Park in Kosovo with molecular and ecological notes. *ZooKeys,* 559, 107-124. doi: 10.3897/zookeys.559.6350

Ibrahimi, H., Slavevska-Stamenković, V., Rimcheska, B., Bilalli, A., & Musliu, M. (2016b). New data of *Potamophylax rotundipennis* (Brauer, 1857) and the first record of *Stenophylax permistus* McLachlan, 1895 (Trichoptera: Limnephilidae) from Kosovo. *Natura Croatica,* 25(2), 259-266.

Klapálek, F. (1899). Prilozi k poznavanju faune Trichoptera i Neuroptera Bosne I Hercegovine. *Glasnik zemaljskog muzeja u Sarajevu,* 11, 323-337.

Klapálek, F. (1902). Zur Kenntnis der Neuropteroiden von Ungarn, Bosnien und der Hercegovina. *Termeszetrajzi Fuzetek,* 25, 161-180.

Kučinić M., Previšić A., Gottstein S., Hrašovec B., Stanić-Koštroman S., Pernek M., & Delić A. (2008). Description of the larva of *Drusus radovanovici septentrionis* Marinković-Gospodnetić, 1970 and *Drusus croaticus* Marinković-Gospodnetić, 1971 (Trichoptera: Limnephilidae) from Bosnia and Herzegovina and Croatia. *Zootaxa,* 1983, 1-17.

Kučinić, M, & Malicky, H. (2002). *Rhyacophila dorsalis plitvicensis* new subspecies from Croatia. In: Wolfram M (Ed) Proceedings of the 10th International Symposium on Trichoptera. *Nova Supplementa Entomologica*, 15, 145-147.

Kučinić, M. (2002). Raznolikost i raspodjela tulara (Trichoptera, Insecta) Plitvičkih jezera. PhD Thesis, Zagreb, Croatia: University of Zagreb, 325 pp.

Kučinić, M., Szivák, I., Pauls, S.U., Bálint, M., Delić, A. & Vučković, I. (2013). *Chaetopteryx bucari* sp. n., a new species from the *Chaetopteryx rugulosa* group from Croatia (Insecta, Trichoptera, Limnephilidae) with molecular, taxonomic and ecological notes on the group. *Zookeys* 320, 1-28. doi: 10.3897/zookeys.320.4565

Kumanski, K. (1985). *Trichoptera, Annulipalpia*. *Fauna Bulgarica 15*. Bulgarska Akademi na Naukite, Sofia. 243 pp.

Kumanski, K. (1988). *Trichoptera, Integripalpia*. *Fauna Bulgarica 19*. Bulgarska Akademi na Naukite, Sofia, 354 pp.

Malicky, H. (2004). *Atlas of European Trichoptera*. (2nd ed.). Springer, Netherlands. 359 pp

Malicky, H. (2005). Die Köcherfliegen Griechenlands. *Denisia* 17: 1-240.

Malicky, H., Previšić A., & Kučinić, M. (2007). *Rhyacophila cabrankensis* nov. spec. from Croatia. *Braueria* 34, 14.

Marinković-Gospodnetić, M. (1980). Fauna Trichoptera SR Srbija. *Zbornik radova o fauni Srbije*. 1(71), 84

Morse, J.C. (2017, September 27). Trichoptera World Checklist. http://entweb.clemson.edu/database/trichopt/.

Neu, P., Malicky, H., Graf, W., & Schmidt-Kloiber, A. (2018). *Distribution Atlas of European Trichoptera*, Conch Books, 891 pp.

Oláh, J. & Kovács, T. (2012). New records of Chaetopterygini species (Trichoptera: Limnephilidae). *Folia Historico Naturalia Musei Matraensis,* 36, 81-88.

Oláh, J. & Kovács, T. (2013). New species and records of Balkan Trichoptera II. *Folia Historico Naturalia Musei Matraensis* 37, 109-121.

Oláh, J. & Kovács, T. (2014). New species and records of Balkan Trichoptera III. *Folia Historico Naturalia Musei Matraensis,* 38, 97-131.

Oláh, J. (2010). New species and new records of Palearctic Trichoptera in the material of the Hungarian Natural History Museum. *Annales Historico-Naturales Musei Nationalis Hungarici*, 102, 65-117.

Oláh, J. (2011). New species and records of Balkan Trichoptera. *Folia Historico Naturalia Musei Matraensis,* 35, 111-121

Oláh, J., Ibrahimi, H., & Kovács, T. (2013a). The genus *Chaetopteroides* (Trichoptera, Limnephilidae) revised by fine structure analysis of parameres. *Folia Historico Naturalia Musei Matraensis,* 37, 93-108.

Oláh, J., Andersen, T., Chvojka, P., Coppa, G., Graf, W., Ibrahimi, H., Previšić, A., & Valle, M. (2013b). The *Potamophylax nigricornis* group (Trichoptera, Limnephilidae): resolution of phylogenetic species by fine structure analysis. *Opuscula Zoologica Budapest,* 44(2), 167-200.

Oláh, J., Kovács, T., Sivec, I., Szivák, I., & Urbanic, G. (2012). Seven new species in the *Chaetopteryx rugulosa* species group: applying the phylogenetic species concept and the sexual selection theory (Trichoptera, Limnephilidae). *Folia Historico Naturalia Musei Matraensis,* 36, 51-79.

Pauls, S. U., Graf, W., Haase, P., Lumbsch, H. T., & Waringer, J. (2008). Grazers, shredders and filtering carnivores -the evolution of feeding ecology in Drusinae (Trichoptera: Limnephilidae. Insights from a molecular phylogeny. *Molecular Phylogenetic and Evolution,* 46, 776-791.

Pauls, S.U., Lumbsch, H.T., & Haase, P. (2006). Phylogeography of the montane caddisfly *Drusus discolor*: Evidence for multiple refugia and periglacial survival. *Molecular Ecology*, 15, 2153-2169. http://dx.doi.org/10.1111/j.1365-294X.2006.02916.x

Previšić, A. & Popijač, A. (2010). Fauna tulara (Insecta: Trichoptera) Kupe, Čabranke i njihovih pritoka (Gorski kotar, zapadna Hrvatska). *Natura Croatica,* 19 (2), 357-368.

Previšič, A., Schnitzler, J., Kučinič, M., Graf, W., Ibrahimi, H., Kerovec, M., & Pauls, S.U., (2014). Micro-scale vicariance and diversification of Western Balkan Caddisflies linked to Karstification. *Freshwater science,* 33, 250-262.

Radovanović, M. (1931). Rezultati ispitivanja balkanskih Trichoptera. *Glasnik Jugoslovenskog entomološkog društva,* 1-2: 159-192.

Radovanović, M. (1935). Trichoptera Jugoslavije. *Glasnik Zemaljskog muzeja u Bosni i Hercegovini u Sarajevu,* XLVI,: 73-84.

Radovanović, M. (1953). Prilog poznavanju Trichoptera Balkanskog poluostrva, prvenstveno u pećinama i planinskim jezerima. *Glas SAN, CCX* 7, 11-38.

Rimcheska, B., Slavevska-Stamenković, V., Ibrahimi, H., Smiljkov, S., Ristovska, M., & Paunović, M. (2015). First Record of the Genus *Helicopsyche* von Siebold, 1856 (Trichoptera: Helicopsychidae) from the Republic of Macedonia. *Acta Zoologica Bulgarica,* 67(3), 443-446.

Schmid, F. (1970). Le genre *Rhyacophila* et la famille des Rhyacophilidae (Trichoptera). *La société entomologique du Canada*, Ottawa. 66, 1-230. doi: 10.4039/entm10266fv

Slavevska-Stamenković, V., Rimcheska, B., Vidinova, Y., Tyufekchieva, V., Ristovska, M., Smiljkov, S., Paunović, M., & Prelić, D. (2016). Contribution to the knowledge of Ephemeroptera, Plecoptera and Trichoptera species from Republic of Macedonia: Distribution and conservation implication. *Acta Zoologica Bulgarica*, 68(2), 199-206.

Stanić-Koštroman, S. (2009). *Faunističke, ekološke i biogeografske značajke tulara (Insecta: Trichoptera) Bosne i Herzegovine*. PhD Thesis, Zagreb, Croatia: University of Zagreb, 235 pp.

Vučkovič, I., Previšič, A., Graf, W. & Kučinič, M. (2011). Description of the female and new data on the distribution of *Annitella apfelbecki* Klapálek, 1899 (Insecta: Trichoptera). *Aquatic Insects,* 33, 381-389.

Waringer, J., Graf, W., Kučinič, M., Previšič, A., & Vučkovič, I. (2009). The larva and life cycle of *Annitella apfelbecki* Klapalek, 1899, including a re-description of *Melampophylax nepos* McLachlan, 1880 (Trichoptera: Limnephilidae). *Aquatic Insects,* 31(1), 71-80.

Wiberg-Larsen, P. (2008). Overall distributional patterns of European Trichoptera. *Ferrantia,* 55, 143-155.

Živić, I., Markovič, Z., & Brajkovič, M. (2006). Contribution to the faunistical list of Trichoptera (Insecta) of Serbia. *Acta Entomologica Slovenica,* 14, 55-88.

Received: August 28, 2019 *Accepted: January 19, 2020*